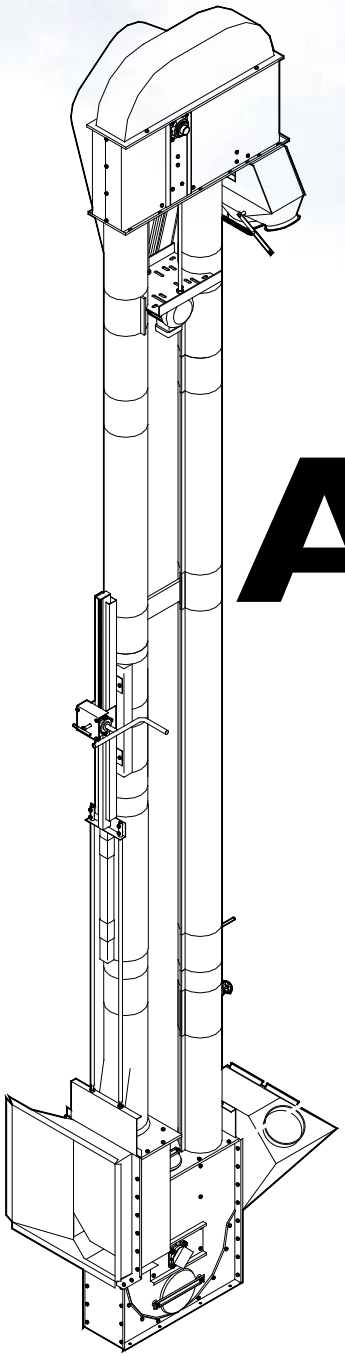
# Installation and Operating Instructions

ANTTI ELEVATORS, A-SERIES

**408011 (en)**



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**08-2010**

Read the Installation and Instruction Manual
carefully before installing the machine and
putting it into operation.

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## SETUP AND ACCESSORIES OF YOUR ELEVATOR

A few details of the setup of your elevator are listed below It is advisable to check the list to correspond the setup of your elevator. This information is useful when ordering spare parts from the factory. Most of the required information can be found in type plates, affixed to the top or boot ends of the machine.

| | |
|---|---|
| MODEL | ___ A-40 ___ A-70 ___ A-90 |
| TOP FRAME NUMBER | ___ 1826 ___ 1825 |
| BOOT FRAME NUMBER | ___ 1831 ___ 1832 ___ 1834 ___ 1835 |
| LARGE DRIVE PULLEY | ___ ø 630 MM SMOOTH |
| | ___ ø 630 MM x 4 SPZ, SLEEVE 3020 ø 35 MM |
| SMALL DRIVE PULLEY (ON MOTOR) | ___ 75 x 4A ø 24 ___ 75 x 4A ø 28 |
| | ___ 75 x 4 SPZ ø 38 ___ 80 x 4 SPZ ø 38 |
| V-BELT | ___ 4 x A120 ___ 4 x SPZ 3150 |
| MOTOR | _____ kW 1500 RPM |
| TYPE | _____ |
| SERIAL NUMBER | _____ |

**INSTRUCTION MANUAL AND OPERATION OF THE MACHINE**

This manual is intended for professional farmers. The use of the machine requires normal skills and general knowledge of farming and agricultural machinery.

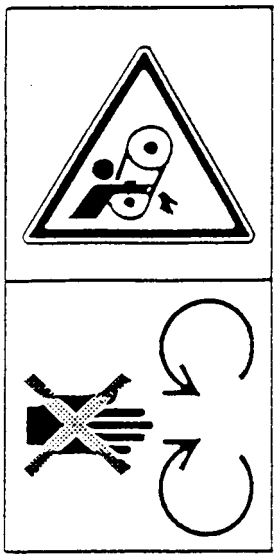
**ELEVATOR MODELS**

This booklet gives information on the installation and operation of the A-40 A40, A-70 and A-90 elevators.

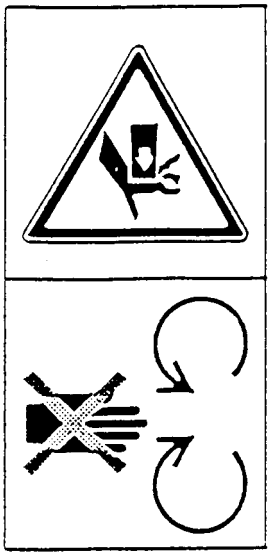
## SAFETY

**The elevator has moving parts which cause serious injuries if touched while the machine is in operation! Never open the hatches or covers of the machine unless you have first ensured that the power supply circuit is disconnected, e.g., by removing the fuse!**

The following warning signs are affixed to the elevator:



**Never open the belt cover while the machine is in operation - risk of injury to hand and arm!**



**Never open the hatch while the machine is in operation - risk of injury to hands and fingers!**

**Special care needs to be taken when making the initial settings, as the elevator will be operated with part of the control and service hatches open at various times. Risk of injury!**

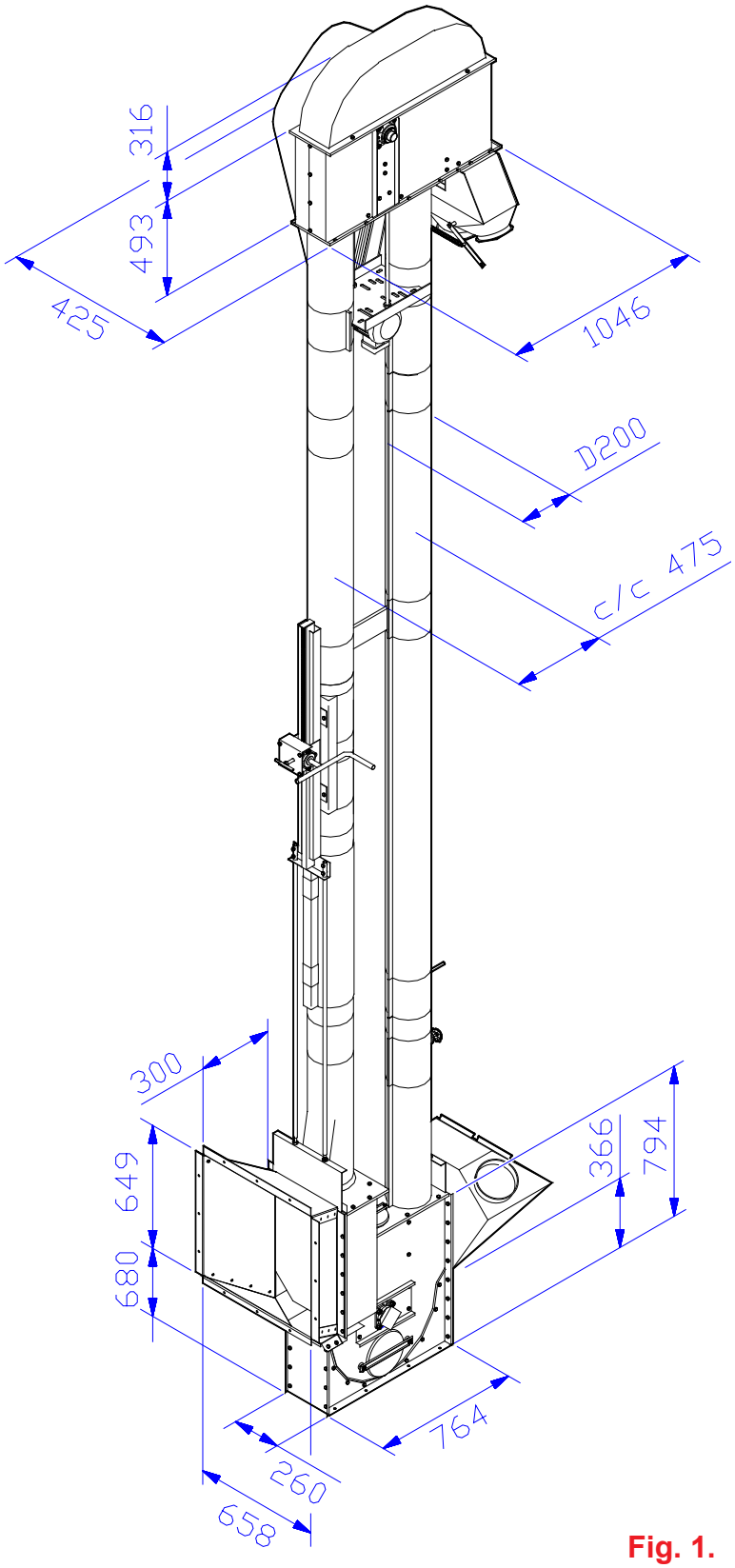



Fig. 1.

**Antti-elevator, A-series, main dimensions**
**Maximum height of the A-series elevator is 17,2 m**

## INTRODUCTION AND INTENDED USE OF THE MACHINE

* The Antti A series farm elevator is designed for vertical transfer of grain and granular materials.

  **Note!** Farm elevators equipped with standard parts are not suitable for conveying sand or other materials that cause excessive wear. Nor are they recommended for transfer of substances exceeding 20 mm in particle size.

* The elevator is of bucket belt type. The buckets are installed so that they form groups. Seen from above, each group consists of 1 - 5 bottomless buckets and one bucket (the lowest) with bottom. The bucket belt is of rubber. The bucket belt of the A-40 and A-70 models is reinforced with two (2) plies, the belt of the A-90 model with three (3) plies.

* The frame pipes of the elevator are made of hot-galvanized round steel pipes.
  The top part and the boot are the other parts of the elevator's frame structure. They are also mostly made of hot-galvanized raw material.

* In addition to the above components, the elevator delivery includes many other items, which are delivered separately. The installation locations for these items are described later in these Assembly Instructions. The components of any optional equipment are also delivered separately.

* The noise emission of a loaded elevator is 73 dB.

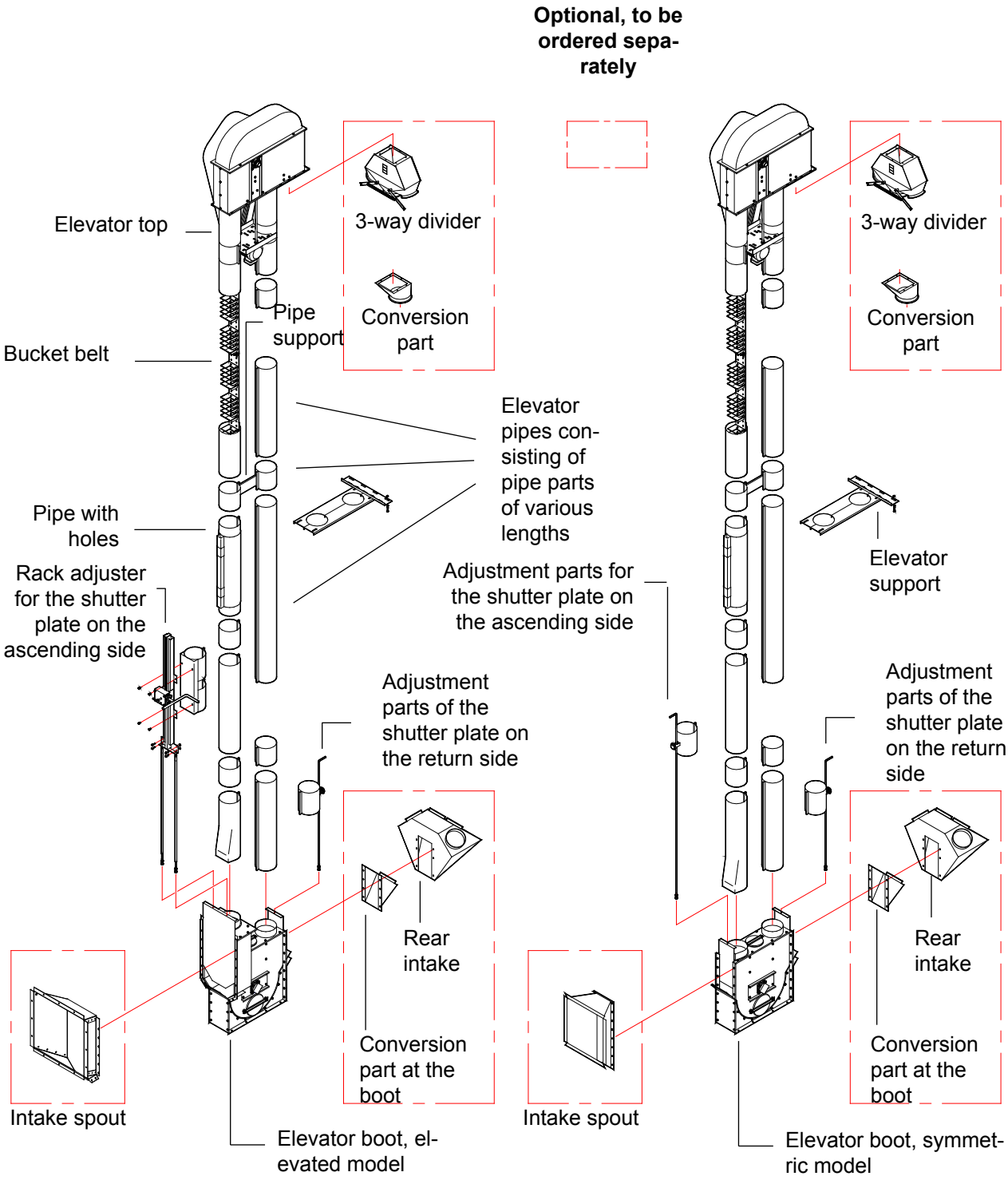

Optional, to be ordered sepa-rately
Elevator top
3-way divider
Conversion part
Pipe support
Bucket belt
Elevator pipes con-sisting of pipe parts of various lengths
Pipe with holes
Rack adjuster for the shutter plate on the ascending side
Adjustment parts for the shutter plate on the ascending side
Elevator support
Adjustment parts of the shutter plate on the return side
Rear intake
Conversion part at the boot
Intake spout
Elevator boot, el-evated model
Elevator boot, symmet-ric model
Elevator with elevated boot
Elevator with symmetric boot

**Fig.2 Antti-elevator, A-series, main parts**

# INSTALLATION

The installation of the elevator requires precision. The work must be carried out on different levels at various elevations. Therefore, in addition to installation skills, the work requires proper scaffolding and observation of safety issues.

**All electrical installations must be carried out by an authorised electrician!**

## Definitions of the elevator parts

The definitions given in the chapter “Main parts of Antti A-Series elevator” are used in the following Installation Instructions.

## Elevator boot

Begin the installation of the A-series elevator by putting the elevator boot in place, as instructed in the installation plan. The boot of the elevated model has an expanded feeding opening and a big shutter plate on the ascending side. The boot of the symmetric model is otherwise symmetric but the outlet sleeve on the ascending side of the boot frame is angular.

The elevator boot must be installed on an even and level floor surface in a manner that the weight of the elevator is distributed evenly across the entire length of the elevator's underside.

- If the surface is not even it should be levelled by secondary casting, using steel plates or any other appropriate means.

The elevator boot does not necessarily need to be fastened to this even base. However, it must be fastened to the filling hopper, which is built separately.

- To facilitate the construction of the hopper, the elevator delivery includes the front intake part.
  If the vertical wall of the hopper is made by casting or building up, the front intake part shall be used as a mould.
  In this case, the elevator boot and the front intake part attached to it should be fixed in place before building up or casting the wall.

- Alternatively, the elevator boot front intake part can be attached to the concrete wall by means of secondary casting, provided that an installation hole with sufficient allowance is reserved when casting the wall.

**Note!** Before attaching the intake part by casting or building up, ensure that all sides of the elevator boot are upright. Any obliquity has to be corrected by placing steel plates under the base of the elevator boot.

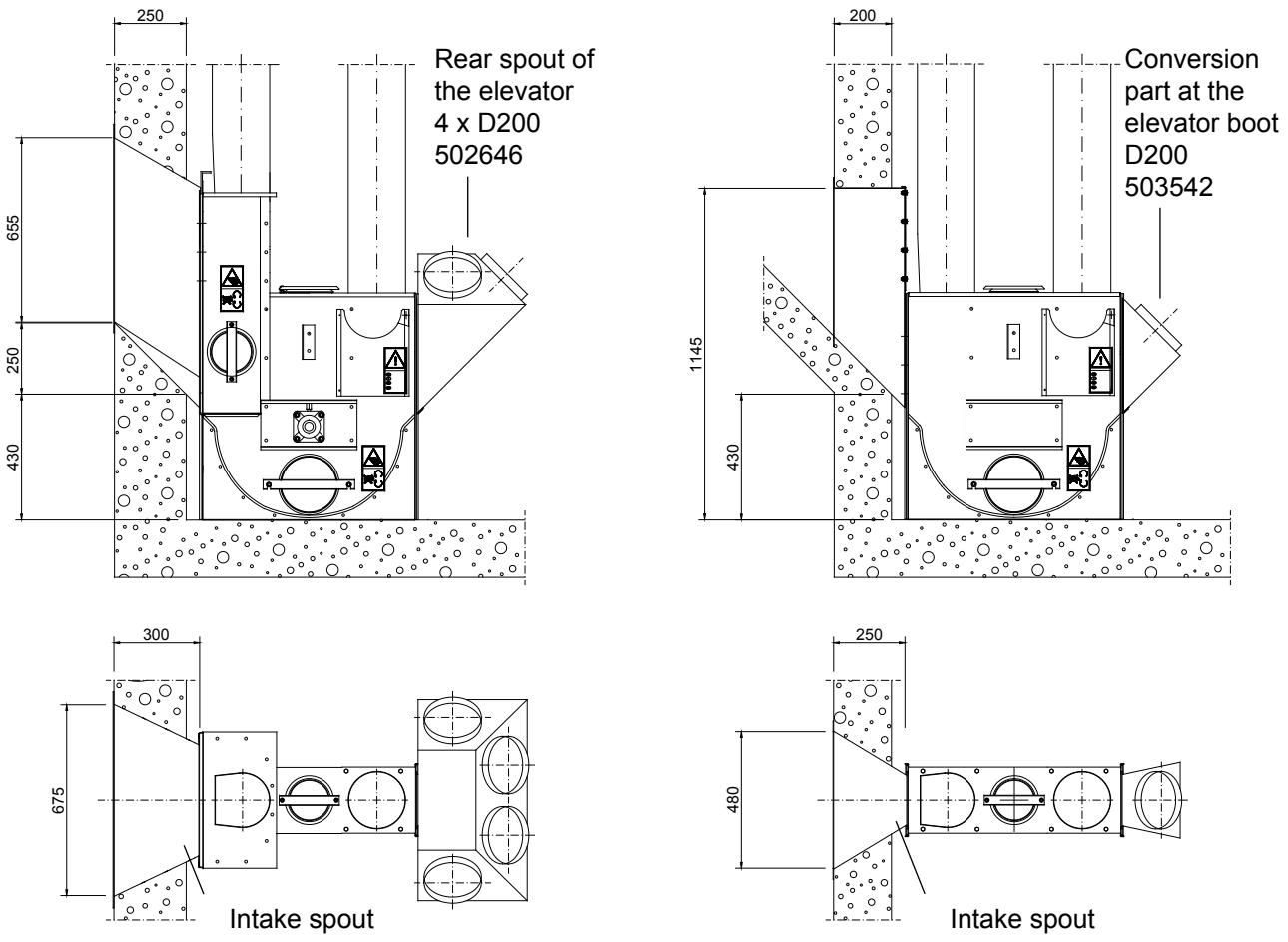
If the elevator boot is not upright, it will be difficult to make the operation of the elevator smooth and noiseless.

**Note!** After the casting of the intake part has dried up, we recommend taking the following measures before tightening the screws attaching the intake part to the boot:

1. Raise the boot by placing metal sheets under it in order to make the lower edge of the intake part fit tight in the slot of the boot.

2. Lift the shutter plate in place and hit it with a hammer to ensure its lower edge closes tightly. After this, tighten the attachment screws.

Put the shutter plates in place on both feed openings and check that the plates can be moved unobstructed in their grooves.




Boot of the elevated model

Boot of the symmetric model

**Fig.3 Boot of Antti A-series elevator**

## Frame pipes of the elevator

**Assembling the pipes**

Install the lowest frame pipes on top of the outlet sleeves on the elevator boot (one inside the other without bands).

Correspondingly, the angular pipe (= "lowest pipe"), which is 0,65 m long at the boot of the elevated model and 1,0 m long at the boot of the symmetric model, is placed on top of the angular sleeve on the ascending side. The lowest pipe on the opposite side is always 1,0 m long.

Join up the following frame pipes with butt joints using clamping pipe bands. Place the side seams of the frame pipes towards the gap between the pipes. Install the bands so that the screw attachments will be positioned between the frame pipes. Join the band pairs together at intervals of 2 to 4 m using intermediate plates. M8 x 30 screws and nuts are used in the bands. When installing the bands, we recommend marking the position of the lower edge of each band with a felt-tip pen to indicate possible movement of the bands from the centre of the joint during installation.

While installing the bands, make sure that the bands for the shutter plate control rods are placed in the correct positions:

The shutter plate on the opposite side of the filling hopper is fitted with a short rod (1250 mm). A lock band equipped with a guide for this rod shall be installed in the first pipe joint (the one with locking wheel).

In the elevator with symmetric boot, one (1) long shutter plate rod (2750 mm) is installed on the same side as the hopper and, in the elevator with elevated boot, two (2) 4000 mm long rods are installed on the same side as the hopper.

In the elevator with symmetric boot, a pipe band is installed for the long rod on the same side as the hopper at a pipe joint where operating the locking device for the shutter plate rod is most convenient.

In the elevator with elevated boot a separate band with guides is installed on the same side as the hopper and a rack adjuster for the shutter plate is installed above it. The band with guides is installed at the pipe joint, which is located approximately in the middle of the final length of the rods.

It is advisable to install the rack adjuster in the elevators with elevated boot at the same time as the installation of the frame pipes.

The bands for the rack adjuster are not normally used as pipe joint bands, because the device should be installed closer to the centre of the pipe. Select the location for the rack adjuster taking into account its easy operation from above the discharge hopper.

Shorten (or lengthen) the shutter plate rods to a suitable length. Drill horizontal holes (D 9 mm) in the upper ends of the rods. The attachment holes for the lifting bar at the lower end of the rack adjuster can be used as jigs during drilling (also see picture no 4).

Fix the shutter plate rods in place. Thread the threaded lower end of the rod into the holes at the top edge of the shutter plate and tighten it on both sides using M10 nuts. Attach the upper ends of the rods to the lifting bar of the rack adjuster using screws.

Install the pipe with plate in the ascending pipe in a location where it is easy to install and maintain. Place the plates in a position which enables access to the bucket belt both from the front and from the rear. Make sure that the plates can be opened without obstruction (even at the end positions of the rack movement).

On the element dryers with storage, in most cases the best position for the pipe with plate is on the top level of the silos, as the space level with the hopper is limited and, because of the rack adjuster, the pipe with plate would have to be lifted unreasonably high.

The delivery of elevators of special length can also include 0,5 m long pipes. The uppermost frame pipes must always be 1,0 m long. The top end of the uppermost pipe on the same side with the divider is angular (lowest/ highest pipe 1,0 m)

Install the motor rack in its position between the uppermost frame pipes using M12 x 25 screws and nuts. Position the motor rack with its smooth side facing down and the attachment hole for the belt cover facing the transmission. Do not place the pipe bands supporting the motor rack at any of the pipe joints.

Level the top rims of the frame pipes (+/-2,0 mm) before installing the top end. The possible height difference may result from a gap in one of the joints. If no such gap can be found in the pipeline, saw off the pipes to the same length. Make sure that the pipes remain equal in length at all stages of the assembly.

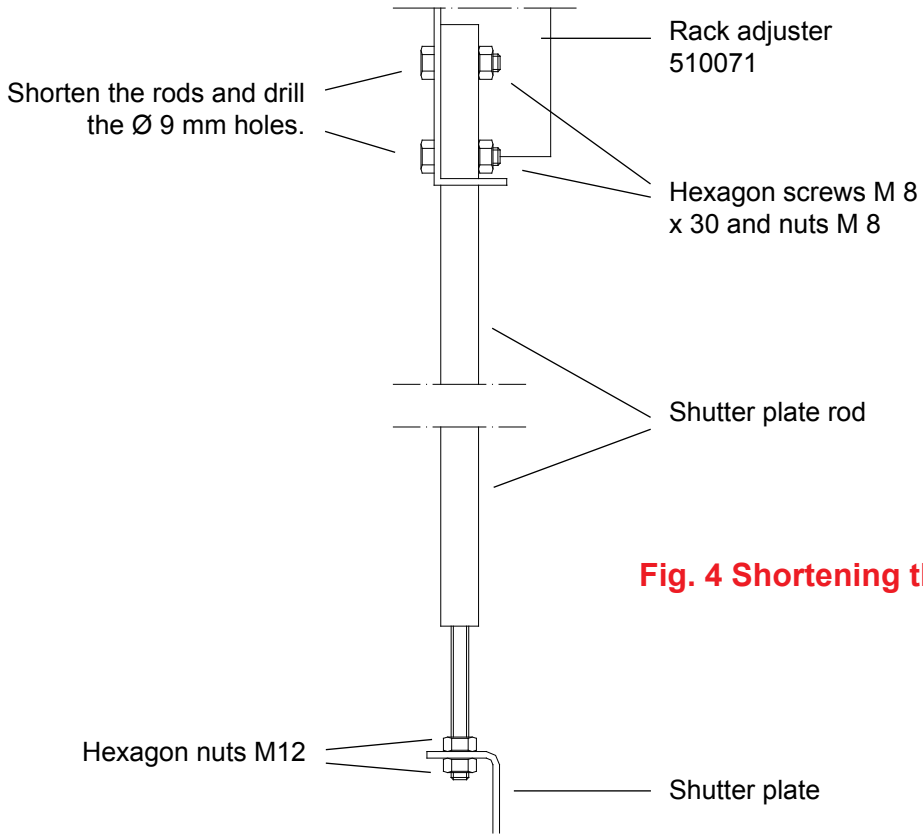



**Fig. 4 Shortening the shutter plate rods (elevated boot)**

## Elevator top

The elevator top is heavy, 96 kg. Use a hoist for lifting.

Install the drive pulley in place in the top end

Begin installation of the Ø 630 mm smooth pulley by removing the protective grease from the shaft end and the hole in the pulley. Use an M10x25 screw and a Ø 40/11 mm washer for attachment.

Begin installation of the Ø 630 mm grooved pulley by removing protective grease from the shaft end. Refer to picture 6 for installation instructions for the Taperlock taper sleeve.

While the top part is lowered on top of the frame pipes, the outlet sleeves on the top end are inserted in the frame pipes. No bands are used in the joint between the top and the frame pipes.

Sometimes, if the space is limited, the transmission must be transferred to the opposite side. This can be achieved by first removing the bearings. Make sure that the motor rack comes in the right way.

Two (2) M16x500 support bolts (threaded bars) are placed between the top end and the motor rack for tightening the transmission v-belts later. Remove the protecting varnish from the motor shaft and tap the pulley in place using a wooden or plastic mallet.

Refer to the table below for nuts and bolts required for the assembly in accordance with the motor size.
Read the table following the horizontal lines.

Lock the belt pulley to the shaft end using a washer and a screw. In the A-90 elevator place a sleeve under the washer. Lift the motor in place below the motor rack and fasten it using four (4) screws (see table), nuts and washers. Select the attachment holes in the motor rack so that the pulley on the engine and the big pulley at the top end align vertically.

If an especially long elevator is to be equipped with a back rotation stop, the stop is attached to one end of the upper bucket pulley shaft. In this case, make sure before installing the transmission V-belts that the motor is connected to rotate in the correct direction.

Fasten the conversion part for the 4-way divider and the divider or the 3-way divider in place.

| Motor kW | Small drive pulley pulley number of grooves Ø mm | | hub Ø mm | Large drive pulley pulley Ø mm | shaft | hub Ø mm | Pipe D51 L31 (pc.) | |
|---|---|---|---|---|---|---|---|---|
| | Attachment of the motor screw (pc.) | | nut (pc.) | screw (pc.) | | Motor shaft end washer (pc.) | Bucker belt pulley, shaft end screw (pc.) | washer (pc.) |
| **A-40 and A-70** | | | | | | | | |
| 1.5 | 75A | 4 | 24 | 615 | 35 | fixed | - | |
| | M10X40 (4) | | M10 (4) | M8X35 (1) | | Ø40/9x3 (1) | M10x25 (1) | Ø40/11x3 (1) |
| 2.2 | 75A | 4 | 28 | 615 | 35 | fixed | - | |
| | M12X50 (4) | | M12 (4) | M10X25 (1) | | Ø40/11x3 (1) | M10x25 (1) | Ø40/11x3 (1) |
| 3.0 | 75A | 4 | 28 | 615 | 35 | fixed | - | |
| | M12X50 (4) | | M12 (4) | M10X25 (1) | | Ø40/11x3 (1) | M10x25 (1) | Ø40/11x3 (1) |
| 4.0 | 75A | 4 | 28 | 615 | 35 | fixed | - | |
| | M12X50 (4) | | M12 (4) | M10X25 (1) | | Ø40/11x3 (1) | M10x25 (1) | Ø40/11x3 (1) |
| 5.5 | 75SPZ | 4 | 38 | 630x4SPZ | | taper sleeve | (1) | |
| | M12X50 (4) | | M12 (4) | M10X25 (1) | | Ø40/11x3 (1) | | |
| **A-90** | | | | | | | | |
| 5.5 | 80SPZ | 4 | 38 | 630x4SPZ | | taper sleeve | (1) | |
| | M12X50 (4) | | M12 (4) | M10X25 (1) | | Ø40/11x3 (1) | | |
| 7.5 | 80SPZ | 4 | 38 | 630x4SPZ | | taper sleeve | (1) | |
| | M12X50 (4) | | M12 (4) | M10X25 (1) | | Ø40/11x3 (1) | | |

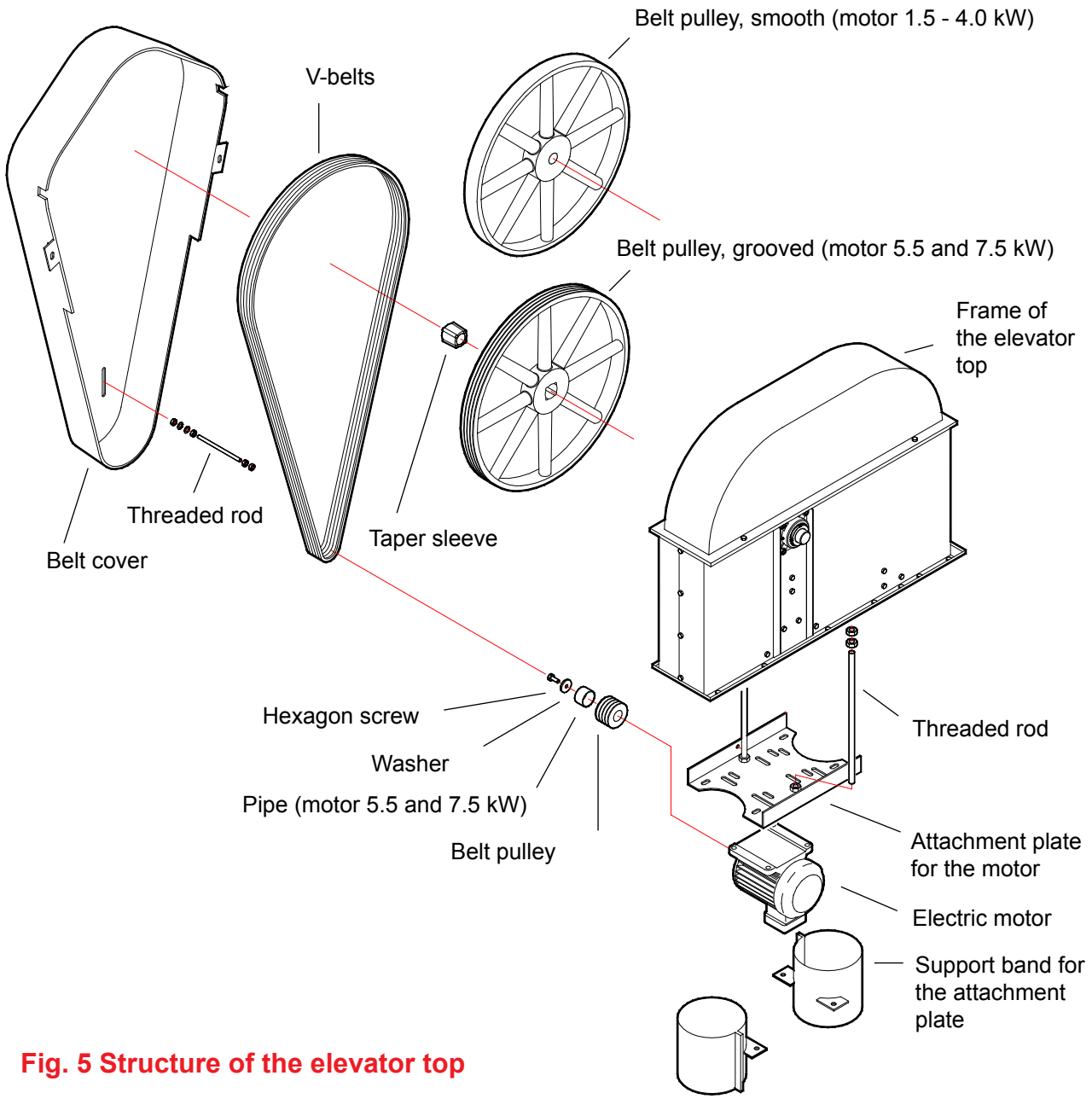



**Fig. 5 Structure of the elevator top**

## Installation of the taper sleeve

ATTACHMENT

1. Remove protective grease from the sleeve and the pulley hub. Place the sleeve into the hub and align the holes.

2. Grease the attachment screws and turn them in place; the locations for the tightening screws are marked in the picture, the thread is in the pulley hub.

3. Clean the shaft, and put the pulley with the sleeve on it. When putting the pulley onto the shaft, make sure that the sleeve is attached to the shaft first and that afterwards the pulley will still move over a short distance with respect to the sleeve.

4. Tighten the screws using a wrench. To 90 Nm.
5. Tap the sleeve lightly using an arbour and retighten the screws. Repeat this procedure a couple of times to ensure the firmness of the sleeve.
6. Check the screws for tightness from time to time.
7. Fill the pullout holes with, for example, grease to prevent them from gathering dirt.

DISASSEMBLY

1. Remove the screws and turn one or two of them, depending on the bushing type, into the pullout holes. The pullout holes are marked in the illustration. The thread is in the taper sleeve.

2. Tighten the screws smoothly until the bushing comes loose from the hub.

3. Remove the pulley from the shaft.

**Fig. 6 Installation of the taper sleeve**

## Straightening the frame pipes

Bring the elevator to an upright position using a plumb line as guide and retighten the band bolts. Brace the sides of the top end and, if the elevator is long, also the middle part (at intervals of 4 - 5 metres) on the dryer machinery using support plates 439103. Check once more that the elevator top stands upright.

## Bucket belt and buckets

### Joining the belt

Lower the belt from above to both sides of the upper pulley in a manner that the side of the belt with thinner rubber layer (with respect to the reinforcement fabric) comes against the pulley. Pull the other end of the belt using a rope under the lower pulley to the opening in the pipe with plates. Fix the device for joining the belt included in the delivery to the belt screw holes on the backside of the belt. Tighten the belt by wrenching the joining device using a ratchet wrench. The tension of the belt is correct when the screw holes for the bucket in the belt are slightly oval.

Use the joint irons for joining the belt (Fig.7). Round off the corners of the belt's excess length so that they form a flap between the buckets.

After removing the joining device, shine a light into the lower opening and look through the pipe from above to ensure that the belt is not twisted a half or a full round.

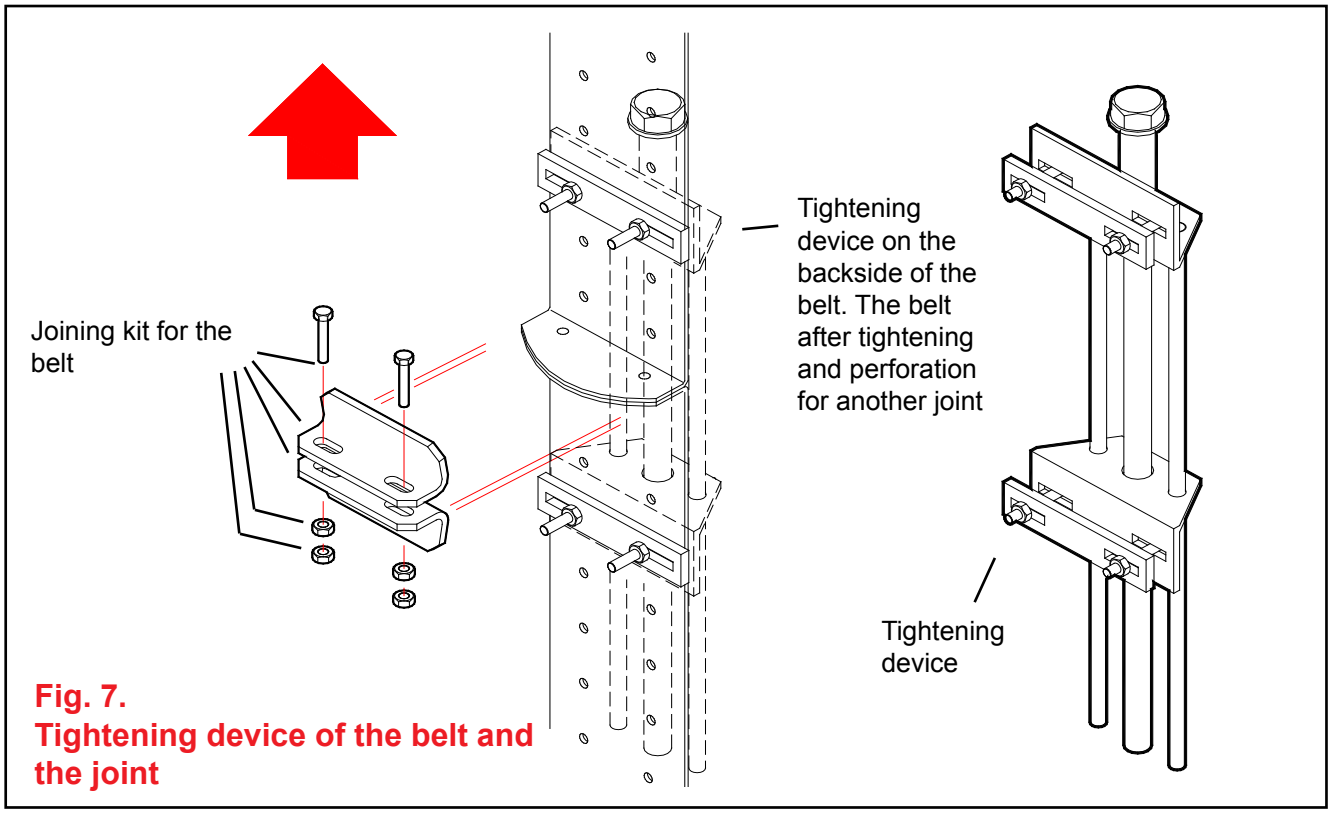
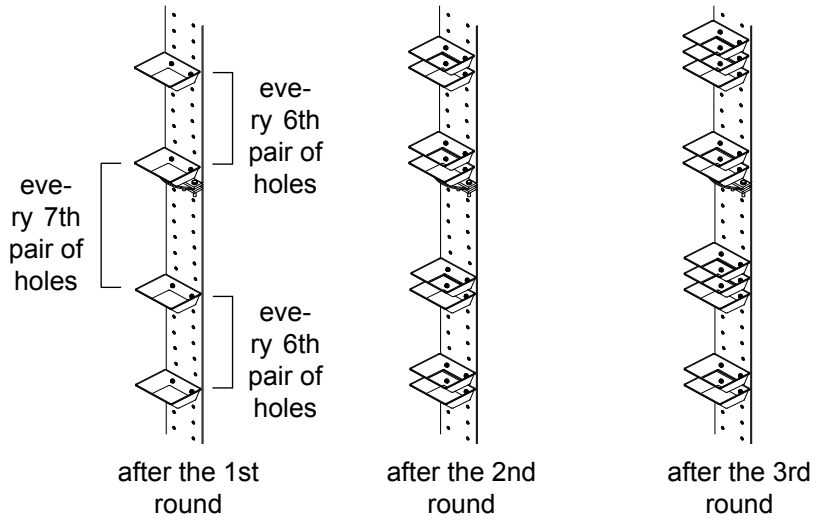

Joining kit for the belt
Tightening device on the backside of the belt. The belt after tightening and perforation for another joint
Tightening device

**Fig. 7.**
**Tightening device of the belt and the joint**

**Attaching the buckets**

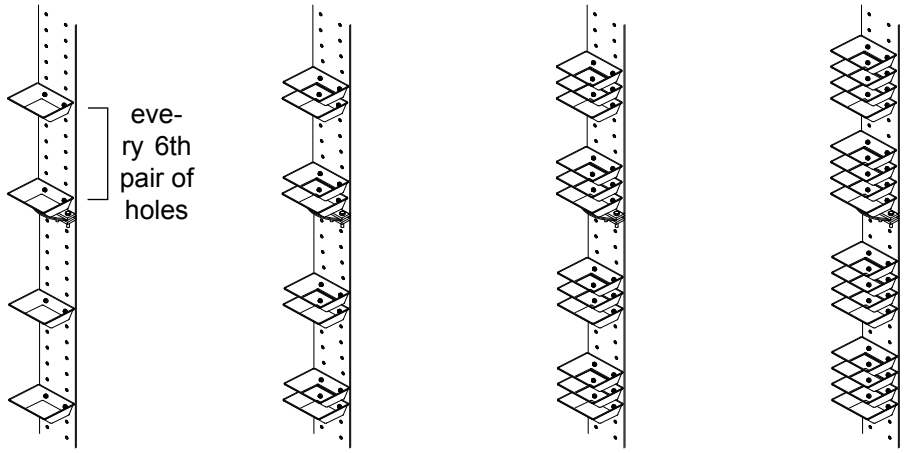
The buckets are usually attached to the belt through the hole in the pipe. Use M8 belt screws and Nyloc nuts for fastening the buckets to the belt. Tighten the nuts until the screw caps sink slightly into the rubber surface of the belt (i.e. the cap does not come in contact with the pulley). If it is difficult to wrench the Nyloc nuts tight at the service hole (the screws rotate), tighten the nuts initially on top of the upper pulley and wrench them to their final tightness at the service hole.

**Fig. 8. Installing the buckets of the A40 elevator**


every 6th pair of holes
every 7th pair of holes
every 6th pair of holes
after the 1st round
after the 2nd round
after the 3rd round

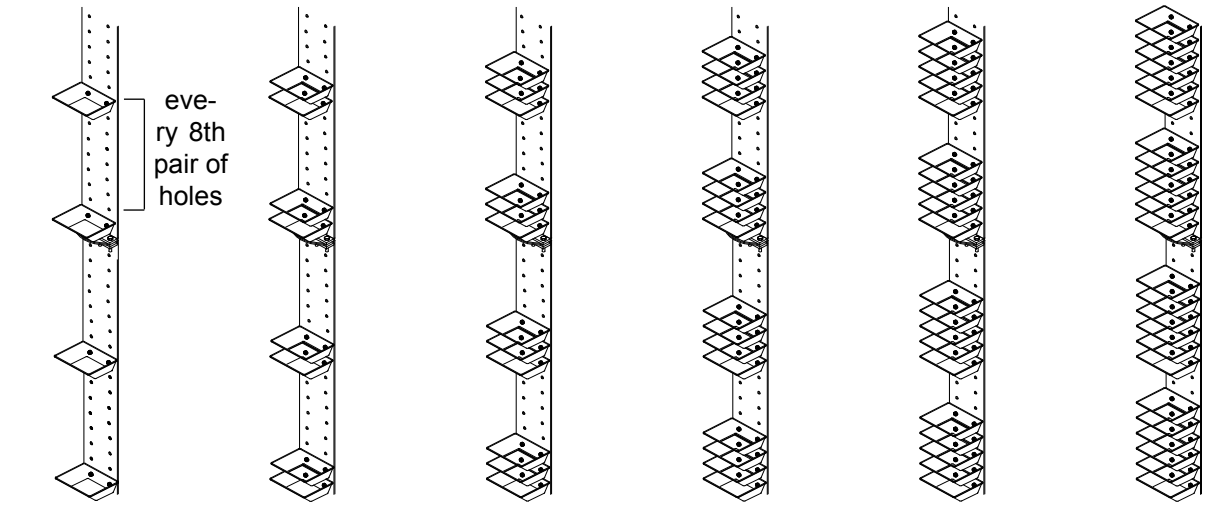
**On the A-40** elevator the buckets with and without bottom are installed in groups. On the first installation round only install buckets with bottom in turns in every sixth (6) and every seventh (7) pair of holes. On the second round install a bottomless bucket above the buckets installed on the previous round (see picture 8). On the third installation round make the gaps equal, i.e. add two bottomless buckets to every other bucket group and one bottomless group to every other so that four (4) empty pairs of holes are left between all bucket groups. Refer to picture 8 for distribution of the bucket groups. The average distribution of the buckets is 7 pcs./metre.

## Fig 9. Installing the buckets of the A70 elevator




**A-70** elevator with and without bottom are installed in groups. On the first installation round only install buckets with bottom in every sixth (6) pair of holes. On the second round install a bottomless bucket above the previous bucket. Repeat the installation rounds until there are three bottomless buckets above each bucket with bottom. Each bucket group consists of four buckets and 2 pairs of holes shall remain unused between the bucket groups. See picture 9. The average distribution of the buckets is 12 pcs./metre.

## Fig. 10. Installing the buckets of the A90 elevator




**A-90** elevator with and without bottom are installed in groups. On the first installation round only install buckets with bottom in every eight (8) pair of holes. On the second round install a bottomless bucket above the buckets installed on the previous round (see picture 10). Repeat the installation rounds until there are five bottomless buckets above each bucket with bottom. Two pairs of holes shall remain unused between the bucket groups. The average distribution of the buckets is 14.2 pcs./metre.

### Elevator brush

Install the elevator brush in one of the unused pairs of holes (Fig. 11).

**Fig. 11 Elevator brush**

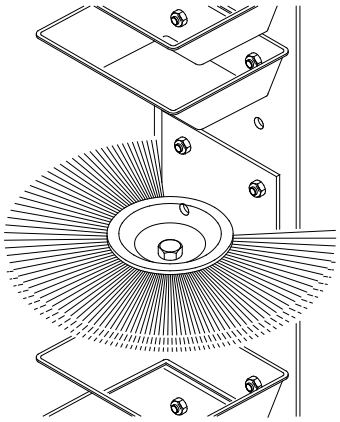
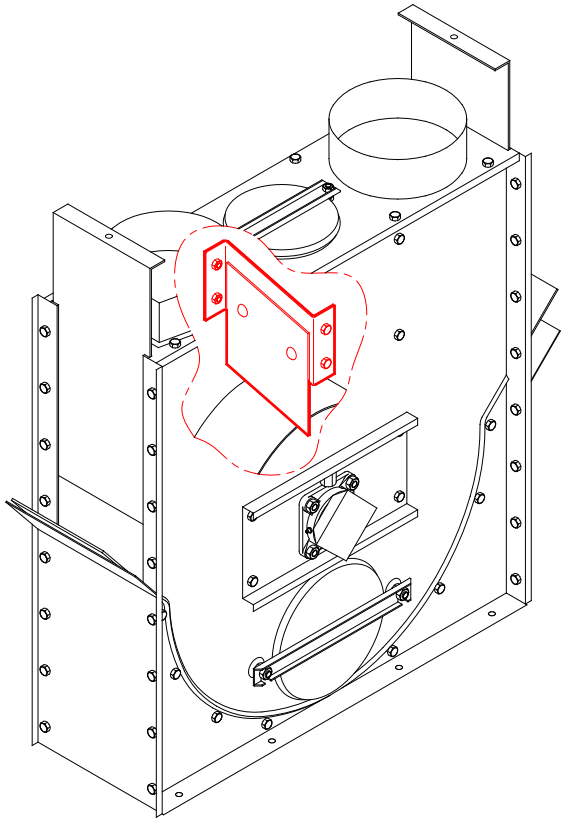


**Fig. 12 Setting the scrapers**



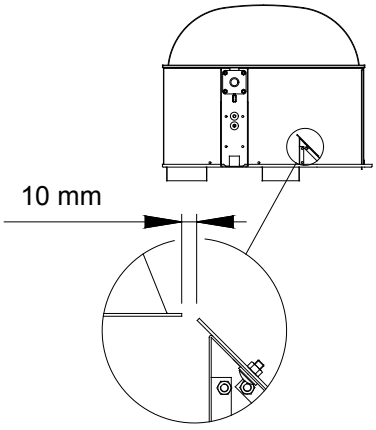
### Setting the scrapers

Adjust the scraper which rubs the surface of both bucket belt pulleys to as close the surface of the belt pulley as possible without causing any extra noise (Fig. 12).

### Setting the adjustment plate

Adjust the adjustment plate above the divider to a position where the buckets pass it at a distance of 10 mm (Fig.13).

**Fig. 13 Setting the adjustment plate**



**V-belts and V-belt cover**

While the fixing bands for the motor rack are loose, the V-belts will be pressed in place by the weight of the motor. The final tightening is carried out by means of the threaded bars.
The tightness of the V-belts is correct while, depressed one by one with a force of two (2) kg, each belt sags 15 mm.

Finally, tighten the motor rack bands.

Install the belt cover in place using M10 nuts and the 10x170 mm threaded bar to be attached to the motor rack.

## Electronic underspeed guard

**(a standard piece of equipment if the control centre of the dryer is delivered later than 1.10.2002)**

Install the underspeed guard in the elevator boot on the side where the possible side intake spout is used less frequently.

> The relay box for 230 V supply voltage is standard equipment in Finland.
> The relay box for 24 V supply voltage is standard equipment in Finland.

The installation proceeds as follows (Fig.14):

Remove the shaft end cover from the device (if installed)

- Attach the claw plate using an M8x16 hexagon screw to the threaded hole in the shaft at the elevator boot. Make sure that one of the two claws has been shortened, i.e. the inductive sensor only records pulses at one of the claws.

- Install the inductive sensor in the cover casing of the shaft end leaving the sensor cable outside the casing. Place one of the attachment nuts for the sensor inside the casing and the other one outside the casing.

- Adjust the perpendicular distance from the sensor to the claw-plate to 5 mm. Tighten the nuts.

Put the shaft end cover in place.

- Attach the relay box for the electronic underspeed guard either to the midmost side-plate of the elevator boot above the shaft end cover or to the dryer building structure within limits set by the length of the cable (do not extend the cable).

- Connections according to the diagrams (see next page). Also refer to the wiring diagram for the control centre of the dryer.

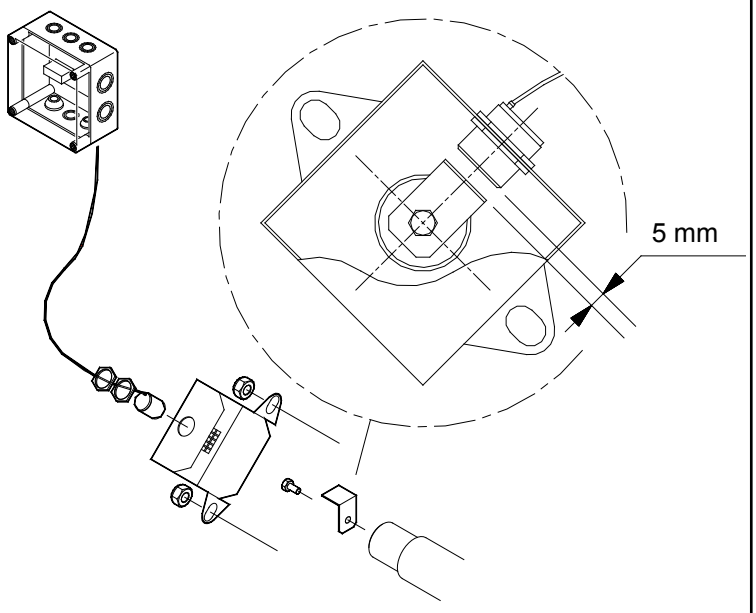
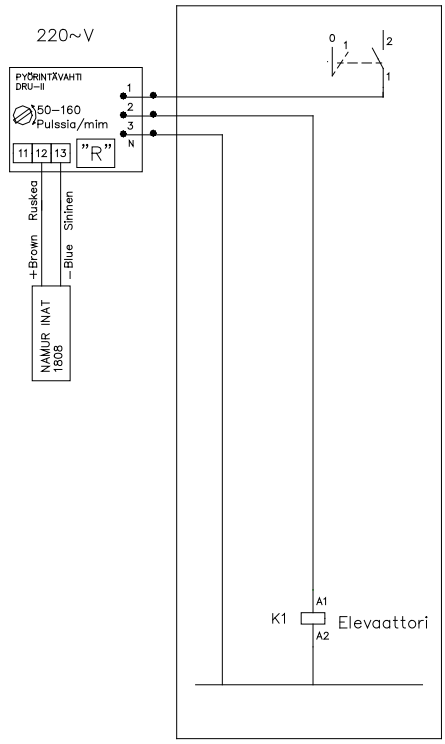



**Fig.14 Assembling and adjusting the electronic underspeed guard**



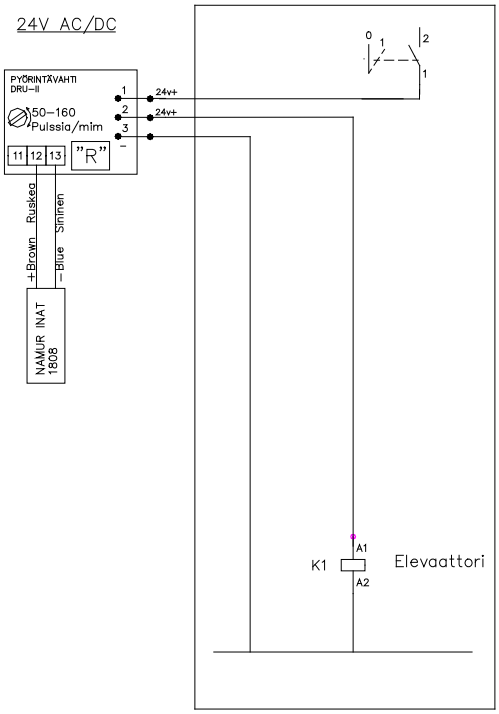

Operation of Digicontrol

**As the elevator is started, the relay "R" is active for nine seconds before the K1 is activated. The elevator must start during this period. Simultaneously, the sensor generates pulses, which make the relay "R" remain active. If the elevator is not running, generation of pulses stops. After this both relays "R" and K1 will be deactivated and the elevator stops. If the underspeed guard has stopped the elevator, you can restart it by turning the operating switch to position "0".**

**Signal lights in the relay box**

| | | |
|---|---|---|
| **Power ON** | **O** | **The LED is illuminated if the supply voltage is connected to the relay box** |
| **Pulse Input** | **O** | **The LED flashes if the sensor is generating pulses** |
| **Run OK** | **O** | **The LED is illuminated if the pulse rate generated by the sensor is correct.** |
| **I.time ON** | **O** | **The LED is illuminated for 9 seconds during the start-up delay. The light goes out as soon as the system is switched to Run OK mode.** |

**Fig.15 Wiring diagram for the electronic underspeed guard (220V)**




Operation of Digicontrol

**As the elevator is started, the relay "R" is active for nine seconds before the K1 is activated. The elevator must start during this period. Simultaneously, the sensor generates pulses, which make the relay "R" remain active. If the elevator is not running, generation of pulses stops. After this both relays "R" and K1 will be deactivated and the elevator stops. If the underspeed guard has stopped the elevator, you can restart it by turning the operating switch to position "0".**

**Signal lights in the relay box**

| | | |
|---|---|---|
| **Power ON** | **O** | **The LED is illuminated if the supply voltage is connected to the relay box** |
| **Pulse Input** | **O** | **The LED flashes if the sensor is generating pulses** |
| **Run OK** | **O** | **The LED is illuminated if the pulse rate generated by the sensor is correct** |
| **I.time ON** | **O** | **The LED is illuminated for 9 seconds during the start-up delay.** The light goes out as soon as the system is switched to Run OK mode. |

**Fig.16. Wiring diagram for the electronic underspeed guard (24V)**

## Mechanical underspeed guard (160 r.p.m., part 511530)

**(a standard piece of equipment if the control centre of the dryer is delivered earlier than 1.10.2002)**

Install the underspeed guard in the elevator boot on the side where the possible side intake spout is used less frequently. The installation proceeds as follows (Fig.17):

- Attach the socket to the screws of the elevator bearing. Tighten the attachment nuts for the socket initially finger tight.
- Apply oil to the groove in the end of the belt pulley shaft.
- Remove the cover for the underspeed guard and connect its frame-part to the socket. Direct the electric connection of the underspeed guard downward. Ensure that the eccentric cam is in the groove in the end of the shaft.
- Press the frame-part to as far as it goes (shaft against shaft) and pull it back about 1 mm. Tighten the lock screw (M8 hexagon socket).
- Rotate the shaft in order to centre the attachment of the underspeed guard socket Tighten the locking nuts for the socket
- Apply oil to the middle shaft of the weight arm and the joints of the adjustment arms. Install the cover and the cover band so that the screw comes on the underside.

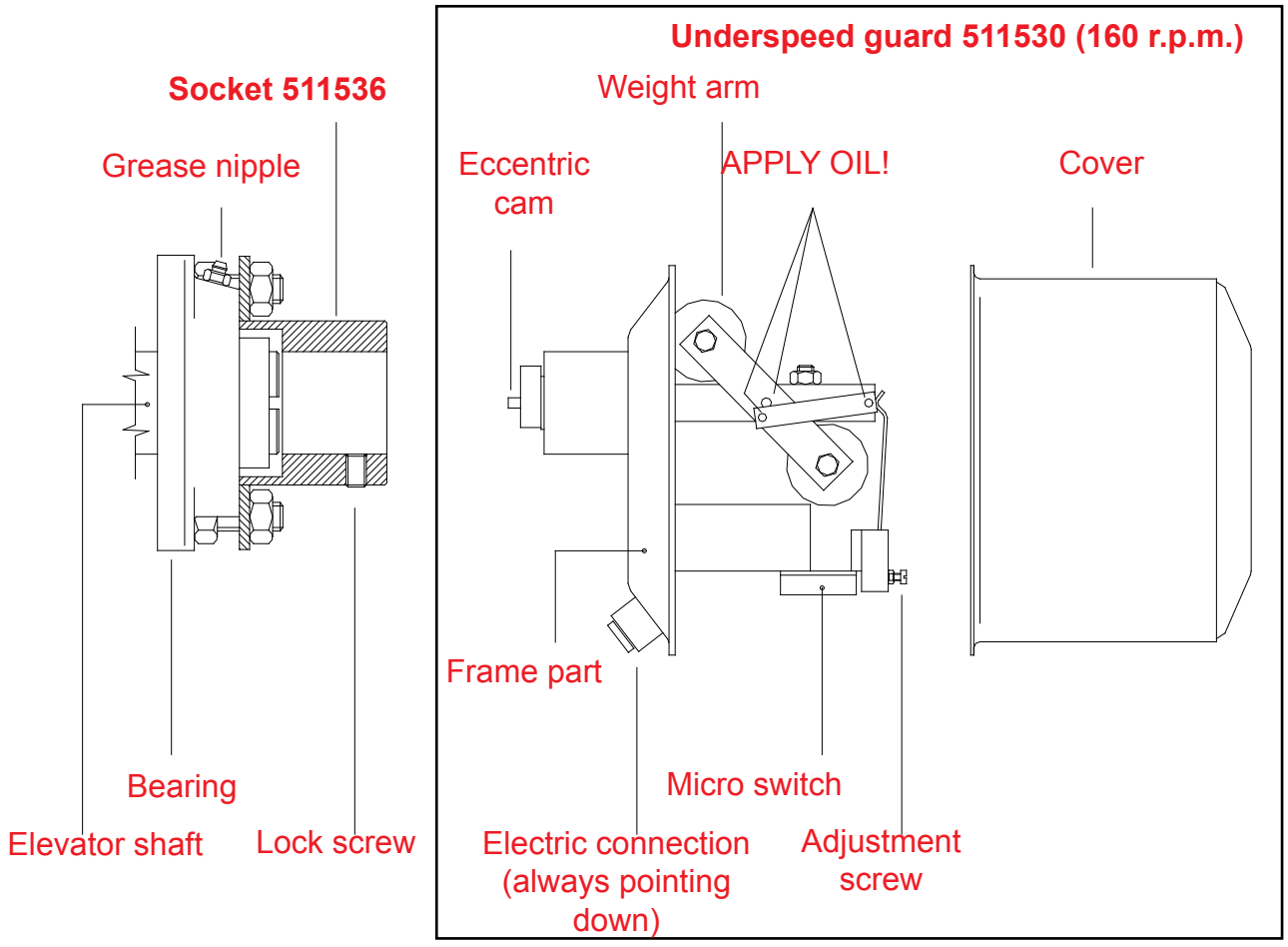



**Fig.17 Assembling and adjusting the underspeed guard**

# OPERATING INSTRUCTIONS FOR THE ELEVATOR

## Initial adjustment and checking of the elevator

**Warning!** **During initial set-up, the elevator must be operated also with its control and service hatches open, which requires that particular caution be exercised. Risk of injury!**

We recommend carrying out the following adjustments and controls before the essential test run and start-up:

1. **Is the bucket belt of the elevator running in the centre of the pulleys and the frame pipes (to ensure quiet running)**

   If this is not the case, then check:
   - upright position of the frame pipes using a plumb line,
   - upright position of the elevator boot using a spirit level,
   - upright position of the elevator top using a spirit level

   If the above-mentioned controls prove necessary, unscrew the attachment screws for the bucket pulley bearing and adjust the position of the pulley using a hexagon socket key as required to make the bucket belt run in the centre of the pulley.

2. **Adjusting the position of the bucket belt pulley scraper at the elevator boot**

   Adjust the plate to as close to the surface of the pulley as possible, however, allowing the elevator to run without making any abnormal noise. If the edge of the scraper comes in contact with the bucket belt pulley or the gap is wider than necessary, carry out the adjustment (Fig. 12).

3. **Adjusting the position of the bucket belt pulley scraper at the elevator top**

   Adjust the scraper in the same way as in the boot.

4. **Checking the position of the adjustment plate above the divider inside the elevator top**

   As necessary, adjust the position of the plate so that the buckets will pass the adjustment plate at a distance of 10 mm (Fig.13).

5. **Checking the bucket belt for tightness and retightening**

   If the bucket belt has been in place for 1 - 2 weeks after the installation, it can be retightened before the test run or first start-up, if necessary.

   Attach the joining device for the belt to the rear of the belt in the rear opening in the pipe (to the screw holes of the two buckets that were removed temporarily) on both sides of the bucket belt joint. Using the joining device, slack off the belt a distance corresponding to 1-2 times the distance between the buckets (depending on the length of the elevator and tightness of the belt), on the A90 elevator 2-5 times the distance between the bucket holes.

Disconnect the belt, cut off the excess length and rejoin the belt using the joint irons.
After removing the device, put back in place the buckets that you removed to make space for the joining device.
The tightness of the belt is correct when the screw holes in the belt are stretched slightly oval and you cannot lift the front edge of the bucket by hand more than 40-50 mm.

**6. Also check the V-belts of the elevator for alignment and tightness**

Check that the pulleys align and are not askew.
As necessary, adjust the tightness of the V-belts using the long support screws between the motor and the top end (before that you need to unscrew the attachment screws for the motor rack clamps)
Install the V-belt cover in place.

**7. Checking the shutter plates**

Check that the shutter plates can be moved freely over a sufficiently long distance in their grooves and that the plate closes tightly in its lowest position.

**8. Check** that there are no foreign objects inside the elevator and all its inspection and service hatches are closed.

**9. Grain pipes**

Check that the grain pipes leaving from the divider are properly fastened and the gradient is sufficient (at least 45º for wet grain, and at least 30º for dry grain).

The grain pipes of the A90 elevator must be at least 200 mm in diameter.

**10. Make sure** the electric motor is connected to rotate in the right direction.

**11. Testing the underspeed guard**

Disconnect the fuses for the elevator motor.
Turn the selector switch to position E.
Turn the feeder switch to position 1.
Start the elevator
If the feeder starts, runs for about 10 seconds and stops, the underspeed guard is in order.
If the feeder continues to operate (which means the underspeed guard is not in order), check the operation of the micro-switch in the underspeed guard and the time relay in the centre.

If the elevator is to be equipped with a Y/D starter, the time setting of the underspeed guard relay must always be about 2-3 seconds longer than the time setting of the elevator's Y/D relay. Otherwise the guard will switch off the motor before it has switched over to the delta connection (the torque of the motor is about 1/3 less in the star connection).

The preset time for the DRU-11 guards is about 8 seconds, which means the Y/D time setting for the motor is about 5 - 6 seconds.

## Operating the Elevator

**Before switching on the elevator, always check that**

- no other person is cleaning or servicing the elevator, for example, on some other floor of the building.
- all service and inspection hatches of the elevator are closed.
- the divider and the grain pipes are in their intended positions.
- the shutter plate is in the **closed**-position.

Switch on the elevator before opening the shutter plates. Usually the shutter plate on the ascending side of the elevator can be opened completely. The shutter plate on the return side can be opened to about half. This enables the maximum output to be achieved.

With turnip rape and dry food grain, the maximum output can usually be achieved by opening the shutter plates slightly less.

If you open the shutter plates too much, the elevator may congest and stop. If the elevator stops while operating at full capacity, it will not be able to restart. In this case, close the shutter plates and channel off excess grain from the lower opening of the elevator. The elevator can be restarted as soon as the grain flow from the lower opening has stopped.

Before changing the cereal it is often necessary to clean the elevator as thoroughly as possible. In this case carry out the checking and cleaning as follows:

- check that there is no grain left in the hopper seams and brush it off, if necessary
- keep the elevator running until the rustling of individual grains can no longer be heard from the frame pipes,
- stop the elevator and open the hatch at the side of the boot. Brush off the last grains from the inner floor using a brush with a handle.

**Warning! Never put your hands in the lower opening of the elevator!!**

To avoid mixing of cereals, do not change the setting of the 3-way divider before the grain flow has stopped or until it has been switched off for a while.

## SERVICING

**Annual service**

Clean up the cooling ribs of the motor and the air impeller.

- Check the condition and tightness of the bucket belt. Adjust as necessary.
- Check the condition and attachment of the buckets.
- Ensure the belt is running properly on the pulley. Check and adjust as necessary.
- Check the position of the bucket belt pulley scrapers. Adjust as necessary.
- Check the condition and tightness of the V-belts. Adjust as necessary.
- Check and lubricate the bearings.
- Check the electric operation of the guard in presence of a skilled electrician at regular intervals.

Lubricate the mechanical guard.

## GUARANTEE

The guarantee period for Antti elevators is one (1) operating season. The guarantee covers defects in material and workmanship. Separate guarantee terms issued by the respective importer apply tor the electric motors.

A prerequisite for validity of the guarantee is that the instructions, given by the manufacturer, and the valid regulations are followed during the installation, operation and maintenance work of the elevator.

All matters related to the guarantee shall be agreed upon with the manufacturer before any action is taken.

## MALFUNCTIONS DURING OPERATION

**Possible malfunctions in the elevator**

| Symptoms | Possible cause | Remedy |
|---|---|---|
| Elevator does not start | | |
| | Selector switch in electric centre is in position 0 | Turn the selector switch to operating position |
| | Overload relay for the engine has tripped | Reset by pushing the R -button. |
| | Fuse has tripped | Change or reset the fuse |
| Inductive underspeed guard | Position of the underspeed guard sensor has changed. | Adjust the distance between the sensor and the claw-plate to 5 mm. |
| Mechanical underspeed guard | Underspeed guard has jammed in the operating position | Lubricate and service the underspeed guard |
| Elevator runs for a while and then stops | | |
| Inductive underspeed guard | Signal light "Power On" on the relay box is not illuminated. | No voltage supply to the relay box. |
| " | "Pulse Input" LED does not flash, although the elevator is running . | Inductive sensor at the end of the elevator shaft does not generate pulses. Adjust the distance between the inductive sensor and the claw-plate (desired value 5 mm). If the distance is correct but no pulses are generated, the inductive sensor is damaged. |
| " | "Run OK" LED is not illuminated, though "Pulse Input" LED is flashing | Inductive sensor does generate pulses, but their number is not sufficient, i.e. about 100 pulses/min. Bucket belt of the elevator is slack or the V-belts skid. Speed adjustment trimmer "Pulse/min" in the relay box for some reason incorrectly adjusted (should give 100 pulses/min). |

| Symptoms | Possible cause | Remedy |
|---|---|---|
| Elevator runs for a while and then stops | | |
| Mechanical underspeed guard | Micro-switch of the underspeed guard has failed. | Replace the micro switch. |
| " | Incorrect adjustment of the intermediary tongue on the underspeed guard's centrifugal weight. | Using the setscrew, adjust the micro-switch to click at the centre of the centrifugal weights' motion path. |
| " | Centrifugal shaft of the underspeed guard does not rotate. | Check that the eccentric pin of the underspeed guard is in the groove of the bucket belt pulley shaft and that it is locked. |
| " | Underspeed guard relay in the electric centre has failed. | Relay to be replaced by an authorised electrician. |
| " | Underspeed guard rotates too slowly becausethe bucket belt is too slack. | Tighten the bucket belt by shortening. |
| Elevator stops prematurely | | |
| | Transmission V-belts are too slack (underspeed guard trips as a result of too low speed). | Tighten the V-belts. See the Installation Instructions. |
| | Bucket belt is too slack (underspeed guard trips as a result of too low speed). | Tighten the bucket belt by shortening. |
| | Feeding rate is too high, protection switch for the engine has tripped. | Empty the elevator (see Operating Instructions), reset the R-button and readjust the feeding rate. |
| | Divider or pipe system is blocked (presence of foreign objects or inclination or diameter of the pipes too small) | Remove the cause for congestion |
| | Setting of the micro-switch near the limit. | Set the micro-switch |

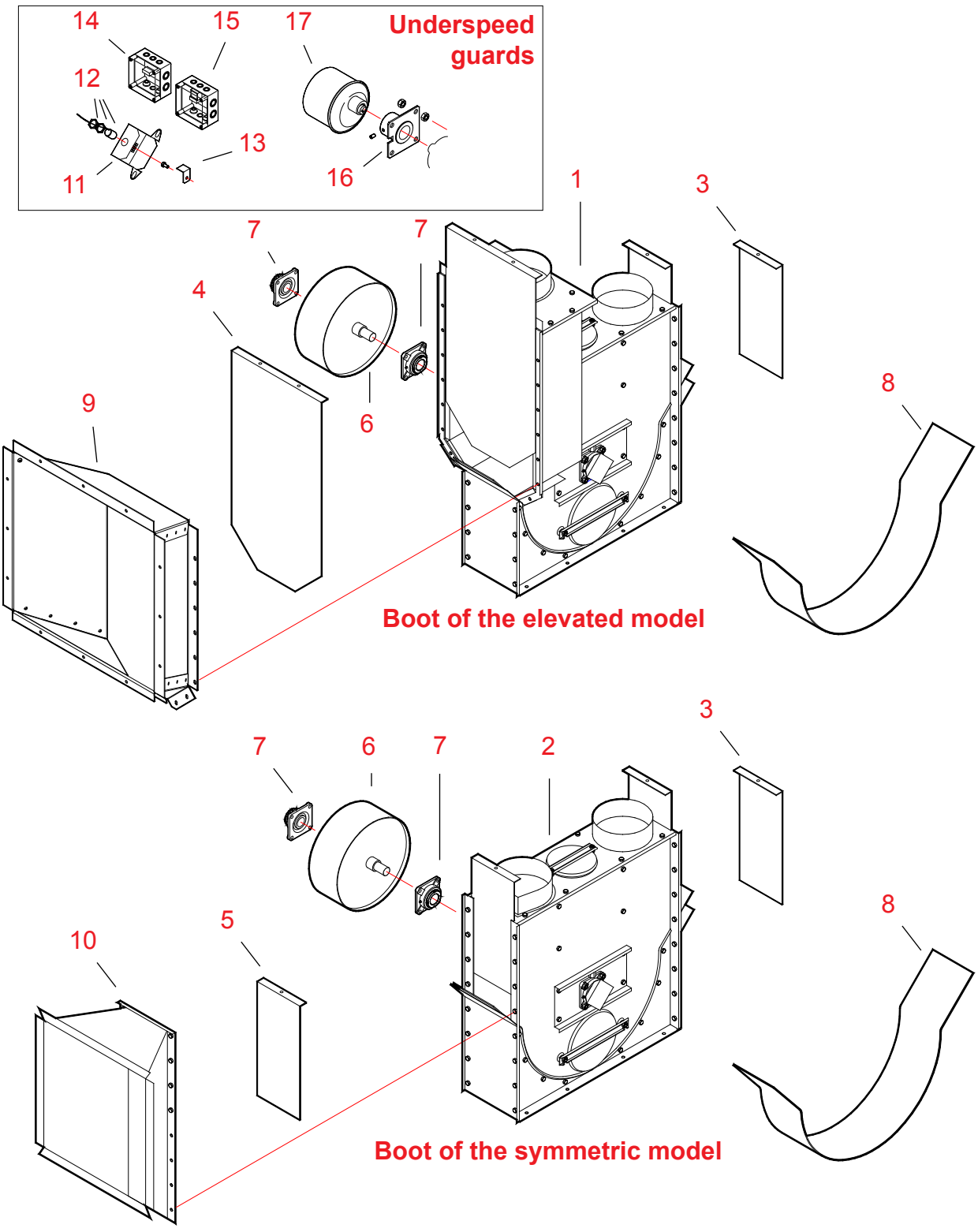
| Symptoms | Possible cause | Remedy |
|---|---|---|
| Capacity of the elevator too low | | |
| | Divider or pipe system is blocked (presence of foreign objects or inclination or diameter of the pipes too small). | Remove the cause for congestion. |
| | Distance between the adjustment plate and the buckets in the top end too big. | Adjust the distance from the adjustment plate to the buckets to 10 mm. |
| | V-belts of the transmission slack. | Tighten the V-belts. |
| | Incorrect electric connections of the motor Incorrect Y/D – connection | Assign an electrician to check the connections |
| | Access of grain into the elevator is obstructed | Eliminate too tight or too gentle spots. |
| Elevator buckets make noise at the boot | | |
| | Bucket belt is slack. | Tighten the bucket belt by shortening. |
| | Elevator boot is not upright; the bucket belt does not run in the middle of the pulley. | Check that the boot stands exactly upright and the bucket belt runs in the middle of the pulley. No deposits of dirt are allowed on the pulley. Adjustment of the scraper for the pulley must be correct. |
| | Possible bearing damage. | Replace the bearings for the bucket pulley shaft at the boot |
| | Bucket belt is damaged (resulting from foreign objects, rodents or a broken bucket). | Replace the damaged bucket or belt. |

| Symptoms | Possible cause | Remedy |
|---|---|---|
| Buckets make noise in the top end | | |
| | Bucket belt is slack. | Tighten the bucket belt by shortening. |
| | Elevator top is not in an upright position, bucket belt does not run in the middle of the pulley. | Check that the top end stands exactly upright and the bucket belt runs in the middle of the pulley. No deposits of dirt are allowed on the pulley. Adjustment of the scraper for the pulley must be correct. |
| | Possible bearing damage. | Change the bucket pulley bearings on the top end shaft. |
| | Bucket belt is damaged (resulting from foreign objects, rodents or a broken bucket). | Replace the damaged bucket or belt. |
| | Adjustment plate too close to the buckets. | Adjust the distance from the adjustment plate to the buckets to 10 mm. |
| Elevator buckets make noise inside the frame pipes | | |
| . | Frame pipes are in an oblique position | Using a plumb line, check that the entire elevator with frame pipes stands upright and straighten them as necessary. |
| Bearings make abnormal noise | | |
| | Bearing damaged. | Replace bearing. |
| | Inner race of the bearing rotates on the shaft. | Tighten the stop screws. If it does not help, replace both the bearing pair and the shaft |
| Elevator is congested or jams, the motor does not stop | | |
| | Time relay of the underspeed has failed | Assign an electrician to check the operation of the relay; repair as necessary. |

**We recommend checking the operation of the underspeed guard from time to time in presence of a skilled electrician, whenever he makes a call on the farm.**

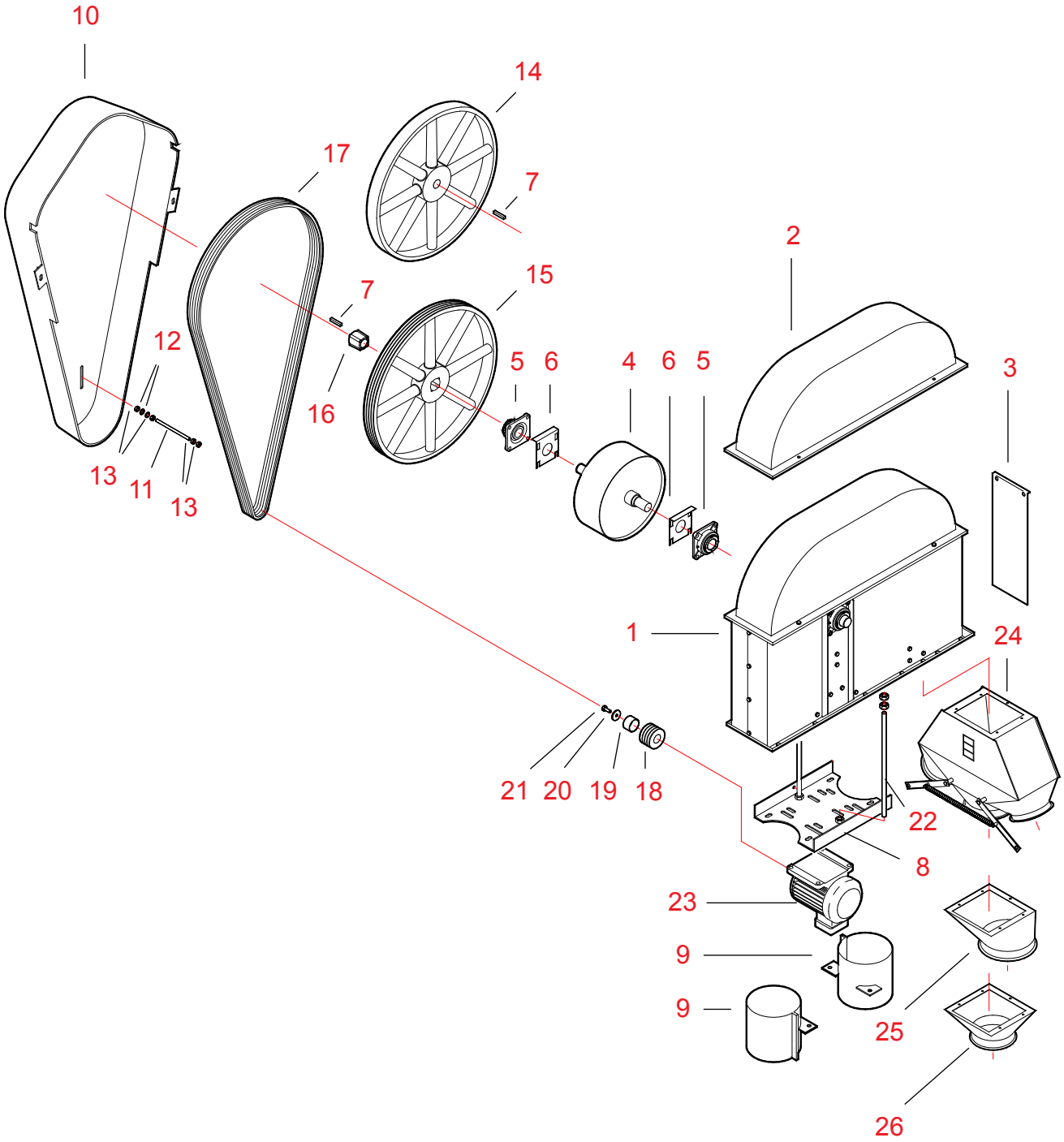
**ANTTI-ELEVATOR, A-SERIES, PARTS DRAWINGS**

## Elevator Boot



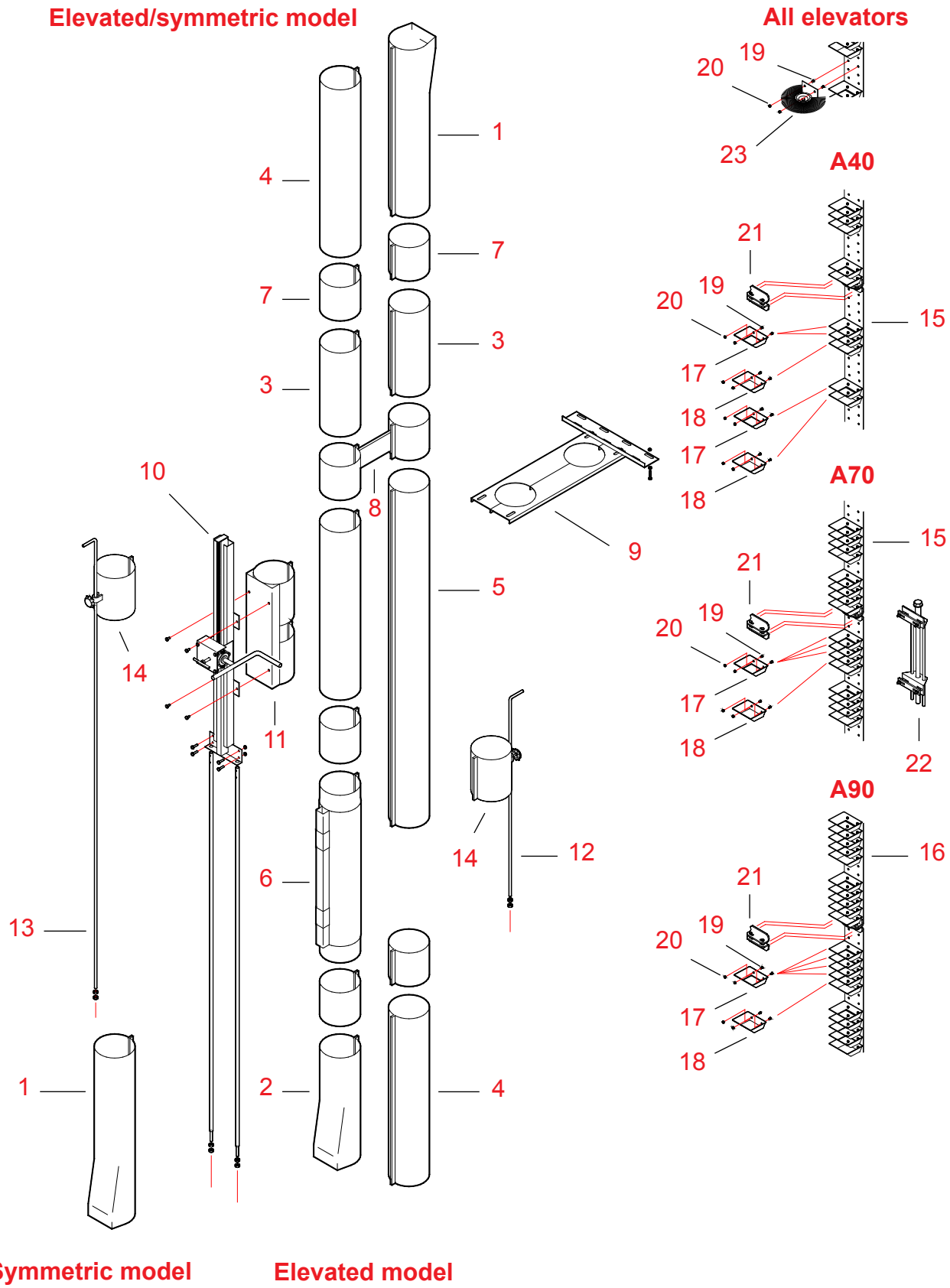
| Ref. | Part | Pcs | Item | Note! |
|---|---|---|---|---|
| 1 | 503494 | | ELEVATOR BOOT<br>Elevated model, assembly | 1831<br>Incl. parts 3-4, 6-8 |
| 2 | 503504 | | ELEVATOR BOOT<br>Symmetric model, assembly | 1832<br>Incl. parts 3, 5 - 8 |
| 3 | 42300 | 1 | Shutter plate - return side | 42300 |
| 4 | 32085 | 1 | Shutter plate - ascending side (elevated model) | 32085 |
| 5 | 42300 | 1 | Shutter plate - ascending side (symmetric model) | 42300 |
| 6 | 508422 | 1 | Bucket belt pulley | 32329 |
| 7 | 313087 | 2 | Flange-mounted bearing UFC205 D30 | |
| 8 | 32110 | 1 | Bottom plate | |
| 9 | A72002 | 1 | Intake spout (elevated model) | A72002 |
| 10 | 504830 | 1 | Intake spout (symmetric model) | 22488 |
| | | | Underspeed guards | |
| 11 | 33224 | 1 | Casing, for inductive underspeed guard | As of 1.10.2002 |
| 12 | 511512 | 1 | Inductive sensor, 100 r.p.m. | As of 1.10.2002 |
| 13 | 42376 | 1 | Claw-plate | As of 1.10.2002 |
| 14 | 511511 | 1 | Relay box, 230V | As of 1.10.2002 |
| 15 | 511513 | 1 | Relay box, 24V | As of 1.10.2002 |
| 16 | 511536 | 1 | Socket, underspeed guard 160 r.p.m. | Before 1.10.2002 |
| 17 | 511530 | 1 | Underspeed guard 160 r.p.m. | Before 1.10.2002 |

## Elevator top



| Ref. | Part | Pcs | Item | Note! |
|---|---|---|---|---|
| 1 | 503484 | 1 | Frame of the elevator top | 1825, incl. parts 2 - 6 |
| 2 | 33093 | 1 | Cover | 33093 |
| 3 | 503707 | 1 | Wear plate at the end | 41568 |
| 4 | 32330 | 1 | Bucket belt pulley | 32330 |
| 5 | 313070 | 2 | Flange-mounted bearing UFC207 D35 | |
| 6 | 41540 | 2 | Cover plate of the hole | 41540 |
| 7 | 205530 | 1 | Rectangular key | 8 x 10, L = 60 mm |
| 8 | 503555 | 1 | Attachment plate for the motor | 22277 |
| 9 | 503595 | 2 | Support band for the attachment plate | 42362 |
| 10 | 22384 | 1 | Belt cover | 22384 |
| 11 | 119010 | 1 | Threaded rod | M 10, L = 170 mm |
| 12 | 111560 | 2 | Washer | M 12 |
| 13 | 110560 | 4 | Hexagon nut | M 10 |
| 14 | 510607 | 1 | Belt pulley, smooth (motor 1.5 - 4.0 kW) | Solid hub |
| 15 | 309968 | 1 | Belt pulley, grooved (motor 5.5 and 7.5 kW) | Tapered hub |
| 16 | 116741 | 1 | Tapered sleeve (motor 5.5 and 7.5 kW) | |
| 17 | 309952 | 4 | V-belt (motors 1.5 - 4.0 kW) | A120 |
| | 310069 | 4 | V-belt (motors 5.5 - 7.5 kW) | SPZ3150 |
| 18 | 310088 | 1 | V-pelt pulley (motor 1.5 kW) | 75 / 24 |
| | 310087 | 1 | V-pelt pulley (motor 2.2 - 4.0 kW) | 75 / 28 |
| | 310086 | 1 | V-pelt pulley (motor 5.5 kW) | 75 / 38 |
| | 310004 | 1 | Belt pulley, grooved (motor 5.5 and 7.5 kW) | 80 / 38 |
| 19 | 208074 | 1 | Pipe (motor 5.5 - 7.5 kW) | D 51/L = 31 mm |
| 20 | 400122 | 1 | Washer (motors 1.5 kW) | D 40 / 9 |
| | 400120 | 1 | Washer (motors 2.2 - 4.0 kW) | D 40 / 11 |
| | 400342 | 1 | Washer (motors 5.5 - 7.5 kW) | D 52 / 13 |
| 21 | 101860 | 1 | Hexagon screw (motors 1.5 kW) | M 8 x 35 |
| | 102210 | 1 | Hexagon screw (motors 2.2 - 4.0 kW) | M 10 x 25 |
| | 102500 | 1 | Hexagon screw (motors 5.5 - 7.5 kW) | M 12 x 25 |
| 22 | 503507 | 2 | Threaded rod | M 16, L = 500 mm |
| 23 | 303003 | 1 | Electric motor - 1.5 kW | |
| | 303556 | 1 | Electric motor - 2.2 kW | |
| | 303514 | 1 | Electric motor - 3.0 kW | |
| | 303557 | 1 | Electric motor - 4.0 kW | |
| | 303545 | 1 | Electric motor - 5.5 kW | |
| | 303550 | 1 | Electric motor - 7.5 kW | |
| 24 | 504647 | 1 | 3-way divider, Ø 160 mm | 2969 |
| | 503539 | 1 | 3-way divider, Ø 200 mm | 1700 |
| 25 | 510476 | 1 | Conversion part Ø 200 mm | 1767 |
| 26 | 510477 | 1 | Conversion part Ø 160 mm | 1761 |

## Elevator pipes, operation of shutter plates and bucket belt



| Ref. | Part | Pcs | | Item | Note! |
|---|---|---|---|---|---|
| | | Elev. | Symm. | | |
| 1 | 503579 | 1 | 2 | Lowest/uppermost pipe, angular - 1,0 m | |
| 2 | 503583 | 1 | - | Lowest/uppermost pipe, angular - 0.65 m | |
| 3 | 503552 | *) | *) | Elevator pipe - 0,5 m | |
| 4 | 400006 | *) | *) | Elevator pipe - 1.0 m | |
| 5 | 400004 | *) | *) | Elevator pipe - 2.0 m | |
| 6 | 503570 | 1 | 1 | Pipe with holes 1,0 m | |
| 7 | 400012 | *) | *) | Elevator pipe band | |
| 8 | 503590 | *) | *) | Intermediate support for the elevator pipes | |
| 9 | 439103 | 2 - 3 | 2 - 3 | Installing the elevator on the dryer | 32253 |
| 10 | 510071 | 1 | - | Rack adjuster | 21793 |
| 11 | 32609 | 1 | - | Attachment part for the rack adjuster | 32609 |
| 12 | 503511 | 1 | 1 | Shutter plate rod, L = 1175 mm | 41557 |
| 13 | 503510 | - | 1 | Shutter plate rod, L = 2,675 mm | 41557 |
| 14 | 503601 | 1 | 2 | Lock band for the shutter plate rod | 31617 |
| 15 | 503633 | *) /m | *) /m | Bucket belt, perforated (A40 / A70) | B 130 70 / 55 - 2 |
| 16 | 503633 | *) /m | *) /m | Bucket belt, perforated (A90) | B 130 70 / 55 - 3 |
| 17 | 800301 | **) | **) | Elevator bucket, with bottom | GB 130 |
| 18 | 800302 | ***) | ***) | Elevator bucket, bottomless | GB 130 |
| 19 | 110040 | 2 | 2 | Belt screw (pcs. / part 17 and 18) | M 8 x 22 |
| 20 | 110790 | 2 | 2 | Nyloc nut (pcs / part 17 and 18) | M 8 |
| 21 | A70219 | 2 | 2 | Joining kit for belt, incl. screws and nuts | |
| 22 | 503630 | 1 | 1 | Joining tool | |
| 23 | 503670 | 1 | 1 | Elevator brush | 31013 |

| | | | |
|---|---|---|---|
| **) | A40 2.8 pcs/m | A70 3,03 pcs./m | A90 2,27 pcs./m |
| ***) | A40 4,2 pcs/m | A70 9.09 pcs./m | A90 11.36 pcs./m |

*) quantity according to the length of the elevator

# EU Declaration of Conformity

ANTTI-TEOLLISUUS OY
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FIN-25340 KANUNKI
Tel. +358 2 7744700
Fax +358 2 7744777

declares that the following machinery which is placed on the market

## ANTTI A-series elevator

**conforms with the provisions of the following directives:**

- Machine Directive 2006/42/EY
- Low Voltage Directive 2006/95/EY
- Electro-Magnetic Compatibility Directive (EMC) 2004/108/EY

**Kuusjoki 01.03.2010**

**Kalle Isotalo**
**Managing Director**